Response formats in questionnaires: Itemized rating scales versus continuous rating scales

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Introduction

Collection of data with standardized measurement items (i.e., question stems and question leaves are the same for each respondent) has a long history in marketing – and an even longer history in the other social sciences. However, this data collection method has been subject to critique over time. For example, an early observer, Wheeler (1937, p. 68), who was one of the first writers of a book with the words "marketing research" in the title, noted that the way in which questions are phrased may affect the results. This aspect of standardized data collection methods has been examined many times since the 1930s, and several researchers have repeatedly shown that the phrasing of the *item stem* indeed affects the results.

Considerably less interest, however, has been devoted to the *item leaf* and the potential of this part of a standardized measure to affect results. In fact, the leaf part of a measure is commonly described in much less explicit terms than is the stem part in many papers' sections on measurement. For example, many authors who routinely refer to their measures as "Likert-type measures" are using something else than what Rensis Likert introduced in the beginning of the 1930's as a new approach to attitude measurement (cf. Likert, 1932).

This paper is a part of a research project in which we attempt to address the item leaf void. In the paper, we report results from an experimental comparison of two general response formats often recommended for research on consumer-related psychological constructs: (1) the itemized rating scale and (2) the continuous rating scale (sometimes referred to as the graphic scale or the graphics-ratings scale). The itemized rating scale is used much more frequently than the continuous rating scale, but the continuous scale seems to offer some advantages in terms of discrimination ability and reliability due to its larger number of points. It has also been suggested that the continuous format produces scores that are more normally distributed than do itemized formats (Grigg, 1980). Moreover, the prevalent use of itemized scales may encourage habitual response behavior; it has been argued that the use of a continuous scale may serve the function of a "cognitive speed bump", in the sense that it may force the respondent to think about what the question really means, and how to respond, to a larger extent than when s/he is faced with yet another itemized scale (cf. Gardner et al, 1998; Shamir & Kark, 2004). In addition, and with an itemized response format, respondents who take part in attitude research every now and then indicate their responses between marked categories – a response behavior suggesting that the continuous format may represent their attitudes more

accurately (Givon & Shapira, 1984). These are some reasons that have encouraged us to undertake the study reported in the present paper. Another reason is that very few comparisons of these two response formats have been made.

The specific purpose of the paper is to compare *multi-item applications* of an itemized response format to a continuous response format. Clearly, many scholars (and reviewers) call for a multi-item measurement approach today, but all existing comparisons of these two formats comprise single-item measures (and there are only a handful of published studies on this matter). Moreover, we compare the two formats in three dimensions. The first dimension refers to the extent to which different response formats produce different levels of reliability in terms of Cronbach's alpha. The second dimension is based on some authors' suggestion that item design may affect a variable's association with its theoretical causal correlates (cf. Schuman & Presser, 1977). That is to say, when the same variable is captured with different response formats, will the resulting alternative measures correlate with different strength with the assumed consequences of the variable? If this is indeed the case, many results from existing correlation-based research, in which there is no comparison of response formats, may be called into question. The third dimension has to do with the potential of different response formats to produce different absolute levels of variables – typically in terms of variable means. Many academic studies, particularly experiments, employ mean comparisons as the main basis for hypothesis testing, but the extent to which such hypotheses becomes confirmed or rejected as a function of the particular response format that happened to be selected is seldom addressed.

Moreover, the specific variable of concern is in this paper, and thus the subject for our comparisons, is brand attitude – indeed a common variable in many marketing-related studies. Yet scholars involved in empirical studies of brand attitude rarely discuss the possibility that the selection of one response format over another may affect reliability levels, correlations with other variables, and variable means.

Theoretical points of departure

The itemized response format and the continuous response format

The main characteristic of *the itemized response format* is that the researcher provides the respondent with a limited number of response categories. Typically, the categories represent a sample of points along a continuum bounded by two extreme responses (e.g., bad and good). Two itemized response formats seem to dominate in contemporary empirical research on psychological variables: the Likert scale and the semantic differential scale. In the classic versions, the Likert scale is a five-point scale and the semantic differential scale is a seven-point scale. It can be noted that the original developers of these scales were explicitly concerned with the physical design of the item leaves – no numbers, but boxes, were supposed to appear in the items leaves (cf. Likert, 1932; Osgood et al, 1957). Since these scales were introduced, many different versions have been used with regard to the number of points and the physical design of the response alternatives (e.g., boxes instead of numbers and boxes with numbers). However, in this paper, we use the classic format of the two scales when we assess brand attitudes. The basic design is as follows (with examples from items used in our empirical study):

A five-point classic Likert scale item:

What is your opinion of cameras from Nikon?

I believe that cameras from Nikon are good

Strongly disagree	Disagree	Neither disagree nor agree	Agree	Strongly agree
( )	( )	( )	( )	( )

A seven-point classic semantic differential scale item:

What is your opinion of cameras from Nikon?

Bad ___:___:___:___:___:___:___ Good

The continuous response format means that a respondent indicates his/her response by placing a check at an appropriate point on a line that is bounded by two extreme response categories. Typically, the line is horizontal, but continuous formats with vertical lines have also been developed (cf. Gardner et al, 1998). Compared to the itemized format, however, the continuous format is used less frequently. Yet it appears in many versions. One example is a 15 centimetre line anchored by ”extremely unwilling” and ”extremely willing” used by Arnold & Feldman (1981). Another example is Puth et al's (1999) use of continuous formats to capture both performance and importance ratings of lipstick attributes. Some authors use the continuous response format as a modification of traditional itemized rating scales. Bradlow & Fitzsimons (2001), for example, used a continuous scale bounded by 1 (do not agree at all) and 100 (agree completely) which thus means that they used basically the same end points as in the Likert scale. Moreover, the examples of continuous rating scales provided by Malhotra (1995, p. 294) can be seen as attempt to "continualize" the semantic differential scale; in his case, the response format is a line anchored by the adjective pair "probably the best–probably the worst" (cf. Gardner et al, 1998 for a similar application). Other applications than having the respondent to mark a point on a line with an X do also exist. For example, Narayana (1977) used a version with 10.5 centimeter line, with numbers appearing along the line, and anchored by "very unsatisfactory" and "very satisfactory", for measures of brand attributes such as taste and price – and in this case the respondent was asked to allocate all brands in the study along the same line. In contrast to the Likert scale and the semantic differential scale, then, it is much more difficult to speak about a "classic" version of the continuous scale – and very little is known about who actually developed the first version.

In our case, we used two versions of the continuous bipolar rating scale that appears in Grigg (1980) and Lampert (1979); the first was a five-centimetre version (to allow for a comparison with the five-point Likert scale), the second was a seven-centimetre version (in order to facilitate a comparison with the seven-point semantic differential scale):

Five-centimeter continuous scale item:

What is your opinion of cameras from Nikon?

Bad ---------- Good

Seven-centimeter continuous scale item:

What is your opinion of cameras from Nikon?

Bad ---------- Good

Do the two response formats produce different results?

Existing literature is silent about what to expect when itemized formats and continuous formats are used in multi-item measurements of the same variable. Yet existing literature offers fuel for some conjectures.

With respect to reliability in multiple-item measures, in terms of Cronbach's alpha, several authors have shown that alpha tends to go hand in hand with the number of points on a response scale. That is to say, the higher the number of scale points, the higher we expect alpha to be (Churchill & Peter; 1984). Given that the continuous format offers more scale points than an itemized format (i.e., the continuous format is more fine grained), it seems likely that the continuous format would result in higher reliabilities than the itemized format. However, because we have seen no previous examination of this aspect, the outcome will have to be settled in empirical terms in our study. It should be noted, however, that Grigg (1980) found that the two response formats (for single-item measures) did not appear to have produced different levels of reliability in terms of test-rest reliability.

Turning to the correlation dimension in our comparison, the correlation between one particular variable X and another variable Y is commonly assumed to be a function of the level of reliabilities of the two measures (Alwin, 1989; Peter, 1979). Given our assumption that the continuous format offers a higher level of reliability than the itemized format, then, we expect higher X–Y correlations when X is measured with the continuous format as opposed to a measurement of X with the itemized format. In addition, and given that the size of the X–Y correlation is a function of the number of point on the scales used for

measurements of X and Y (i.e., restrictions in the number of points results in lower correlations; cf. Martin, 1973), we expect a higher X–Y correlation when X is captured by a the continuous format as opposed to an itemized format. Friedman & Friedman (1986) made a comparison of this type, but they found no differences between the correlations produced by the two formats. However, they used single-item measures, they did not reveal what type of itemized scale they used, only that it was a 7-point scale, and their constructs were not typical for marketing applications of rating scales (Friedman & Friedman dealt with individuals' assessments of their own height, weight, waist size etc and the correlations of these assessments with actual physical characteristics). In our case, brand attitude is in focus, and the perhaps most commonly assumed theoretical consequence of brand attitude is intentions. Therefore, intentions will be used as the effect variable in our empirical examination of the potential for different rating formats to produce different correlations with external variables.

The issue of mean levels that a variable reaches when it is captured with a continuous format versus an itemized format is basically open. One author, Lampert (1979), who compared responses to some continuous scales and itemized scales, found that the type of bipolar continuous scale we focus on in this paper produced different mean values compared to an itemized scale – but he presented neither the resulting means nor any indication of which scale scores that reached the highest level. One possible factor that may create differences in means, however, is related to scale familiarity from the respondent's point of view. Given that itemized scales are used much more frequently than continuous scales, it seems safe to assume that most respondents are more familiar with the itemized format. The continuous format may therefore interrupt respondents' routinized responding by requiring them to think more carefully about what is being asked and how they need to respond; the relatively less familiar format may represent a "cognitive speed bump" (Gardner et al, 1998; Shamir & Kark, 2004). In fact, when Lampert (1979) compared various response formats, he found that the bipolar continuous scale was perceived by the respondents to be the most difficult scale to respond to. A similar observation is provided by Grigg (1980). This indicates that a respondent may use more cognitive effort for continuous scales and thus that more processing time is needed. Given that processing time creates a polarizing effect (Tesser, 1978), we expect a higher frequency of extreme responses for a continuous scale. In the specific case of brand attitude, however, and given that stimulus brands are of the familiar and popular type (i.e., existing attitudes are already positive rather than negative), we expect that polarization creates a higher frequency of *positive* responses as opposed to negative responses. Under the

assumption that the continuous scale indeed requires more effort, then, this means that we expect the continuous scale to render *higher* levels of brand attitude than an itemized scale.

Research method

Research design and measures

Our main response variable is brand attitude, so our first step was to develop a set of specific leaf items for the design of multi-item applications of itemized rating scales and continuous rating scales. Typically, a set of adjectives is used to capture different nuances on a bad-good continuum, and as a point of departure we decided to use three adjective pairs frequently employed in empirical studies of brand attitudes: bad-good, negative impression-positive impression, and do not like it-like it. Similar measurement items appear, for example, in Mitchell & Olson (1981). Next, we selected a set of stimulus brands. The data were collected in one specific country, Sweden, so we used brands that we assumed would be familiar to Swedish respondents – and thus brands that would be subject to attitudes. Four brands with these qualities were selected: Volvo, Nikon, Marabou (a leading chocolate brand), and SAS (a Scandinavian airline).

In the following step, and for each of the four brands, we created two alternative three-item measures of brand attitude to allow for four comparisons of an itemized rating scale and a continuous rating scale. These alternative measures were included in two questionnaire versions according to the outline in Table 1. Each three-item measure was introduced to the respondent with the following question: "What is your opinion of (a major product class covered by the brand) from (brand name)"? For example, and as already indicated, "What is your opinion about cameras from Nikon?" was used as the item stem for the specific measure of brand attitude towards Nikon.

Table 1:

The brand attitude measures in the two questionnaire versions

Brand	Version 1	Version 2
Volvo	Continuous (7 cm)	Semantic differential (7-point)
Nikon	Likert (5-point)	Continuous (5 cm)
Marabou	Semantic differential (7-point)	Continuous (7 cm)
SAS	Continuous (5 cm)	Likert (5-point)

More specifically, the classic semantic differential scale (used for the Volvo and the Marabou comparisons) comprises seven scale points (cf. Osgood et al, 1957), and therefore the continuous scales involved in the comparisons with this semantic differential scale consisted of a seven centimeter line to separate the brand attitude adjectives. The responses to the individual semantic differential scale items were scored from 1 to 7, while the responses to the individual items in the continuous format were scored from 1 to 70 (we used a ruler to assign response scores to the respondents' marks on the line; a similar approach was used by Friedman & Friedman, 1986). Similarly, our classical five-point Likert scale items were scored from 1 to 5 (for the Nikon and SAS comparisons), and the corresponding continuous format items were scored from 1 to 50 with a ruler. Seen in the context of individual item scores for the continuous format, then, the format may be continuous in a graphic sense (i.e., in terms of how it appears in a questionnaire), but the scoring results in a number of distinct points.

These assessments of brand attitudes would allow us to compare of itemized scales and continuous scales with regards to (a) reliability in terms of internal consistency and (b) the mean level of brand attitude. In order to examine if the two types of scales would also (c) produce different correlations with an external variable, we included a measure of intentions for each brand. In each case, the (single-item) intention measure was framed as follows: "The probability that I will use X during the remaining part of this year is…," and it was followed by an open response space in which the respondents were asked to provide a probability

estimate ranging from 0 (very unlikely) to 100 (very likely). Roughly 5 months remained of "this year" when the data were collected. The selection of this particular response format for the intention items, which was thus different from the itemized rating scales and the continuous scales, was made to minimize the risk of method variance. That is to say, we expect inflation in the correlations if the same type of scale is used to create both brand attitude and intention measures. The reason why we used single-item measures for this part of the study is based on the arguments in Rossiter (2002), who strongly object to multi-item measures for intentions.

Sample and data collection

The questionnaire was distributed to participants in marketing classes. We distributed the questionnaires to the participants at the beginning of the seminar, we supervised the completion task, and we controlled the environment in the sense that no talking amongst participants was permitted. Moreover, responses to all questionnaire items were explicitly encouraged. An incentive was also provided; a lottery draw was made from the pile of returned questionnaires, and a couple of winners received a price worth USD 5. These activities reduced non-response behavior to a minimum. The two versions were distributed randomly to the respondent as they were seated and no indication was provided that two versions did exist. In order to obtain variation in our measures, we included two different groups of participants – who participated in marketing classes at two different geographical locations – in the study. The first group comprised undergraduate students (n = 70), and the second group consisted of adult practitioners who took part in an executive education program (n = 55). No main differences were identified between these two groups, so they were pooled for the main analysis. The number of participants who completed the first version of the questionnaire was 63, and 62 participants completed the second version.

Analysis and results

The first comparison between the two response formats dealt with the reliability in brand attitude measures derived from an itemized format (based on three individual items) and a continuous format (also based on three individual items). However, no distinction could be made between the two formats in terms of the level of Cronbach's alpha; the two formats

produced basically the same level for each brand attitude variable (all alphas were in the .86 – .95 range). In our case, then, the two formats did not appear to have produced different levels of alpha. This finding was contrary to our expectations, given (a) existing arguments in the literature in support of a positive association between the number of scale points and alpha and (b) the higher number of points in the continuous format.

Turning to the second comparison, and given the high alphas, we created two brand attitude variables for each brand; one based on the itemized format and the other based on the continuous format. The mean of the individual items was used in each case to create variables for the further analysis. Next, we computed the correlation between each brand attitude variable and its corresponding intention variable. However, we did not find any response format-related pattern of differences for the zero-order correlation between brand attitude and intentions. In two cases (Volvo and Nikon), the itemized format produced higher correlation coefficients than the continuous format (r = .35 vs. r = .02 for Volvo, and r = .54 vs. r = .38 for Nikon). In the two other cases (Marabou and SAS), the continuous format produced higher correlations (r = .54 vs. r = .33 for Marabou, and r = .14 vs. r = -.03 for SAS).

With respect to the comparison of mean level of brand attitude, it was necessary to first convert the scores derived from the continuous format to make them comparable with the scores from the itemized format (cf. Grigg 1980 for a similar procedure). For the comparisons involving the five-point itemized format (Nikon and Marabou), in which each measurement item takes on values in the 1-5 range, we pentachotomized the responses to the continuous items so that they took on values in the 1-5 range. More specifically, responses on the continuous scale in the 1-10 range were assigned the value 1, the 11-20 responses were assigned the value 2, and so on. A similar rescoring process was undertaken for the comparisons involving the itemized seven-point format (Volvo and SAS), but in this case the rescoring was extended to deal with scores in the 51-60 and 61-70 range. The Volvo and SAS raw scores from the continuous measurement items were thus heptachotomized.

Obviously, this “de-continualization” means that information is lost, but rescoring is necessary for a true comparison of mean levels between the two response formats. It should be kept in mind that the numerals assigned to itemized scale points are arbitrary and not analogous to numerals that represent physical distance. For example, “1”on a line measured in

centimeters is not analogous to "1" assigned to the lowest extreme alternative on an itemized scale, because the line contains a response interval below "1" cm.

In the following step, Cronbach's alpha was computed for each new set of "de-continualized" items, and given the resulting high alpha levels (all alphas were virtually identical with those derived from the raw scores), new brand attitude variables were created as the mean of the item responses. For the itemized format, we kept the same brand attitude variables that we used in the correlation comparison. Given these two comparable sets of brand attitude variables, then, we computed the means and assessed the differences with t-tests. The results, presented in Table 2, indicate that there were no differences between the two formats.

Table 2:
Mean brand attitude derived from the two response formats

Brand	Itemized format	Continuous format	*p*
Volvo	5.38	5.39	.96
Nikon	3.47	3.66	.13
Marabou	5.38	5.41	.89
SAS	3.56	3.71	.32

Although no difference between the two response formats was significant, it can be noted that there was a slight tendency for the responses derived from the continuous format to reach higher levels than the responses derived from the itemized format. This was what we expected, given the polarization argument discussed in the theoretical section.

Discussion

Summary of main findings

With regard to brand attitude, the focal variable for our response format comparisons, it does not seem to matter if the researcher is using multiple-item scales based on an itemized format or a continuous format for the item leaves: no systematic differences could be identified in our study with regard to reliability levels, correlations with intentions, and mean levels.

Implications, limitations, and suggestions for further research

Our findings imply that it does not seem to matter much if the researcher selects an itemized or a continuous response format. Given that a continuous response format is more difficult to score, and might have greater potential for clerical errors (Gardner et al, 1998), it is therefore tempting to suggest that researchers should avoid the continuous format.

This temptation, however, must be resisted; it must be seen in the light of some limitations in our study. One obvious limitation is that we used only one particular variable for the response format comparisons (i.e., brand attitude). Moreover, the reliability levels for brand attitude is often very high (>.85) in academic research (cf. Lange & Dahlén, 2003; McKenzie & Lutz, 1989), a factor that may have influenced the comparison on reliability levels between response formats. Research on other variables than brand attitude is therefore needed before the final word is said about the effects of an itemized versus a continuous response format. Another limitation is that our data did not allow us to explain the differences in brand attitude-intentions correlations response formats. The empirical results appear stochastic, but it is possible, in further research, to include variables such as involvement and brand familiarity to assess the strength of the correlations.

Furthermore, our itemized scales must be regarded as a limited sample from a huge population of variants of the classic Likert scale and the classic semantic differential scale. The investigator who may feel inclined to include such variants in future assessments of response format effects, however, should be prepared for something that we discovered in this project: researchers rarely report what specific response format they actually use. In fact, we believe that much more explicitness is called for; statements such as “we used Likert-type

items" in method sections are not very informative given the many different scale versions that do exist.

It should also be noted that we used an experimental design in which the basis for comparison was derived from participants who respondent to different versions of response scales. Other designs are indeed possible. A design in which each respondent is exposed to each response format is an alternative approach, and this approach would allow for an assessment of method variance – an issue that we were not in the position of addressing given our research approach.

Future research should also explore if the response formats affect outcomes in the increasingly common case of examinations of several variables linked to each other in cause-and-effect chains (i.e., a typical approach when structural equations modeling is used). In that particular case, which thus involves the measurement of many different constructs with the same questionnaire, we believe that method variance issues are important. Indeed, it is in such situations, particularly when all constructs are measured with the same response format, that we suspect that respondents become prone to habitual response behavior. And habital response behavior is likely to create artificially high associations between variables. One solution, however, may be to break up the response format monotony with alternative response format – and it is possible that the continuous format may be a viable candidate for this task. Yet further research is needed to establish the extent to which the continuous format is indeed a "cognitive speed bumb." Viswanathan et al (1996) have developed a set of measures to assess respondents' perceptions of response formats (e.g., ease of completing a scale), and such measures may be used to clarify this issue.

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